Oregon's Nutrient Program

Developing nutrient targets to meet DO, pH, chlorophyll *a,* and nuisance algae standards.

Aron Borok
Water Quality Standard Specialist

An ounce of prevention

- No discharges to lakes (1976?)
- Onsite program for septic system management (1981)
- CAFO permit (early 1980s)
- Phosphate detergent bans (1992, 2009)
- Ag. WQ Management Area Plans and Rules (1993)
- Stormwater BMPs

Background

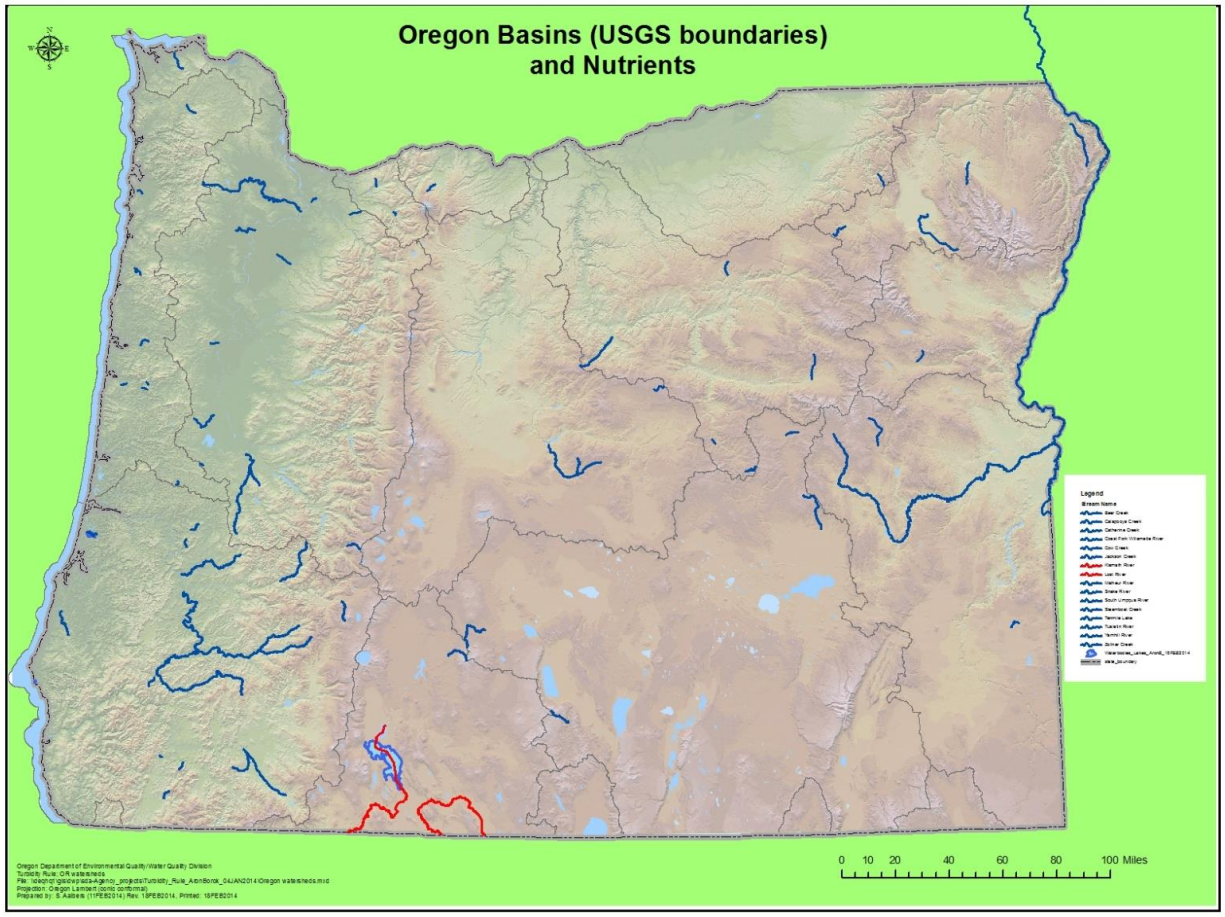
- DEQ has established nutrient targets in 16 watersheds* to address DO, pH, chl-*a*
- Site-specific; targets vary by pollutant form and concentration
- Other pollutants (temp, BOD) can cause or contribute to impairment.
- Many streams are nutrient poor.

* - Two additional currently under development

Relevant Standards

- Dissolved oxygen - 5.5 – 11.0 mg/l depending on use
  - In salmonid waters 8.0 – 11.0 mg/l (most waters)
- pH – basin-specific range (6.5 or 7.0 to 8.5 or 9.0)
- Chlorophyll *a* – 0.01 – 0.015 mg/l depending on waterbody type; requires study and finding
- Narrative – “development of fungi or other growths…may not be allowed.”

Oregon waters with nutrient targets



~25-30% of area in Oregon is subject to a nutrient target.

Targets

Pollutant	# TMDLs	Range
Total phosphorus	12	7.1-110 µg/L 576 lbs/yr
PO_4-P	6	7 -35 µg P/L
Dissolved inorganic nitrogen	3	20 – 45 µg N/L
Total nitrogen	2	520 µg/L
Nitrate	1	22 kg/day*Q

Considerations for the analysis

- How severe is the impairment? What is it's extent?
- What is the cause of the impairment? Is it related to phytoplankton or periphyton?
- What are the contributing sources? Are there nutrient sources upstream of the impairment?

Run the model!

- Multi-linear regression models, multi-variate analysis, or mechanistic modeling to determine cause and reductions necessary to meet criteria.
- Determine if nutrients low enough to limit algal growth.
- What is limiting nutrient (N or P)?
  - It may be more cost-effective to focus on other nutrient (i.e., point source)
- Impairment may be due to:
  - Nutrients (TP, TN, PO_4-P, DIN)
  - Light or temperature
  - Sediment oxygen demand
  - Flow
  - CBOD or NBOD
  - Some combination of the above

Example 1: Grand Ronde TMDL

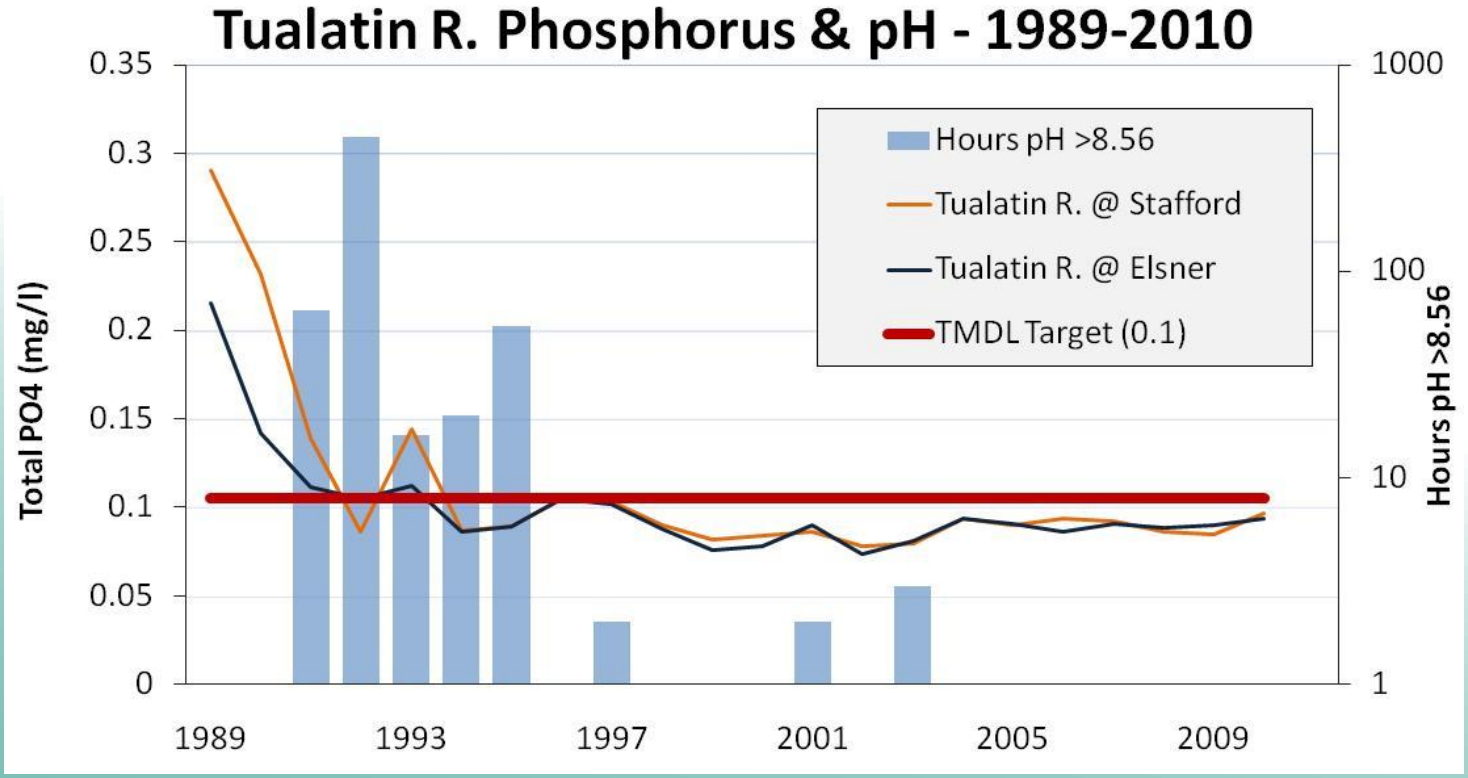
- DO and pH impairments due to excessive periphyton.
- Two TMDLs:
  - Temperature reductions and nutrient targets. (DIN 20-40 µg/l; PO_4-P 7-15 µg/l)
  - More stringent nutrient targets if temperature reductions not achieved. (DIN 15-32 µg/l; PO_4-P 5-12 µg/l)
  - No summer discharge for La Grande and Union WTPs

Example 2a: Tualatin Tributaries(2001)

- DO impairment, but low chlor-*a* and phytoplankton”
  - CBOD (minor sink)
  - Nitrification from ammonia (minor)
  - Sediment oxygen demand (major)
- Addressed by temperature TMDL and organic suspended solids target

Example 2b: Tualatin Mainstem (1988)

Phosphorus TMDL led to marked improvements for pH, chlor-*a,* and TP concentrations with mixed results for DO.



Example 2b: Tualatin Mainstem

- 2001 TMDL addressed additional DO, pH, and chlor *a* impairment due to:
  - CBOD/NBOD
  - Sediment oxygen demand (settleable volatile solids)
  - Temperature
  - Nutrients (large algal blooms on the mainstem)
- TP targets set at background levels (0.04 – 0.19 mg/L) to address pH impairment and exceedance of chlorophyll *a* action level.
- 2012 TMDL: two new allocations and allowed phosphorus trading.

Final thoughts

- Where nutrient issues are site-specific, targets should be site-specific.
- Prevention always a goal.

Aron Borok

borok.aron@deq.state.or.us

503-229-5050